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one wave-length-dependent element changing the light rays brought to interference depending on the wavelength. At least one of the detectors is designed, or in combination with a demodulator and/or optical elements, such that a time and/or spatial modulation of the intensity with reference to a whole or parts of the detected ray cross-section, can be measured. Further, a device to generate optical signals by modulation of optical carriers and use of a device as the optical receiver or optical modulator or as a spectrometer are provided.- -.

IN THE CLAIMS:

Cancel Claims 1-20 without prejudice and substitute therefore Claims 21-

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21. A device for detecting optical signals, comprising
means (10,11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

- (i) frequency shift and modulation;
- (ii) phase shift and modulation; and
- (iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical signal to be detected and reference light ray(s) such that they can be brought into interference; and

at least one detector (40) with a demodulator (50) being structured and arranged to detect amplitude modulation;

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wherein at least one wavelength-dependent element (11, 12, 14) is structured and arranged to change angle(s) of the rays brought into interference depending upon wavelength; and

at least one of the detectors (40) is structured and arranged alone or in combination with at least one of a demodulator (50) and optical elements, to measure at least one of time and spatial modulation of intensity with reference to an entire or parts of the detected ray cross-section.

22. A device for generating optical signals by modulation of optical carriers, comprising

means structured and arranged for generating at least one reference light ray which has at least one of

- (i) frequency shift and modulation;
- (ii) phase shift and modulation; and
- (iii) time displacement, over the optical carrier to be modulated;

means structured and arranged for aligning at least one of the optical signal to be detected and reference light ray(s) such that they can be brought into interference; and

at least one coupler structured and arranged to couple out the resulting interference signal;

wherein, at least one wave-dependent element is structured and arranged to change angle(s) of the light rays brought into interference, depending upon wavelength; and

at least one of the couplers is structured and arranged either alone or in combination with at least one of a demodulator and optical elements, to make the coupled-out signal dependent upon at least one of time and spatial modulation of intensity with reference to an entire or parts of the detected ray cross-section.

23. A device in accordance with claim 22, wherein said generating means (10, 11, 20, 80) include a beam splitter and at least one of a frequency shifter and modulator, a phase shifter and modulator (20), and a travel distance (90).

24. A device in accordance with claim 21, wherein said generating means (10, 11, 20, 80) include a local light source.

25. A device in accordance with claim 21, wherein at least one of said wavelength-dependent elements (11, 12, 14) includes a diffracting optical element.

26. A device in accordance with claim 25, wherein said diffracting optical element is at least one of an optical grating (11, 14), a hologram, and a system of thin films.

27. A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements (11, 12, 14) includes a dispersing optical element.

28. A device in accordance with claim 27, wherein said dispersing optical element is a prism (12).

29. A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements (11, 12, 14) is structured and arranged as a beam splitter (11) or combiner.

30. A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements (11, 12, 14) is structured and arranged to change type or degree of dependence of angle deflection by the wavelength.

31. A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements is structured and arranged simultaneously as at least one of

- (a) a frequency shifter and modulator; and
- (b) a phase shifter and modulator.

32. A device in accordance with claim 31, wherein one or more of the wavelength-dependent elements is structured and arranged as an acousto-optical modulator.

33. A device in accordance with claim 21, additionally comprising means for deflecting at least one of the reference light ray and optical signal.

34. A device for detecting optical signals, comprising means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

- (i) frequency shift and modulation;
- (ii) phase shift and modulation; and
- (iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical signal to be detected and reference light ray(s) such that they can be brought into interference; and

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation;

wherein at least one wavelength-dependent (11, 12, 14) is structured and arranged to change angle(s) of rays brought into interference depending upon wavelength;

at least one of the detectors (40) is structured and arranged alone or in combination with at least one of a demodulator (50) an optical elements, to measure at least one of time and spatial modulation of intensity with reference to an entire or parts of the detected ray cross-section; and

at least one of the wavelength-dependent elements (11, 12, 14) is structured and arranged to be at least one of rotatable and swivellable.

35. A device for detecting optical signals, comprising

means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

- (i) frequency shift and modulation;
- (ii) phase shift and modulation; and
- (iii) time displacement over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical signal to be detected and reference light ray(s) such that they can be brought into interference;

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation;

wherein at least one wave-length dependent element (11, 12, 14) is structured and arranged to change angle(s) of the rays brought into interference depending upon the wavelength;

at least one of the detectors (40) is structured and arranged, alone or in combination with at least one of a demodulator (50) and optical elements, to measure at least one of time and spatial modulation of intensity with reference to an entire or parts of the detected ray cross-section; and

additionally comprising at least one of a multiplex hologram and other optical elements structured and arranged for simultaneously handling multiple rays.

36. A device for detecting optical signals, comprising means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

- (i) frequency shift and modulation;
- (ii) phase shift and modulation; and
- (iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical signal to be detected and reference light ray(s) such that they can be brought into interference;

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation;

wherein at least one wavelength dependent element (11, 12, 14) is structured and arranged to change angle(s) of the rays brought into interference depending upon wavelength,

at least one of the detectors (40) is structured and arranged, alone or in combination with at least one of a demodulator (50) and optical elements, to measure at least one of time and spatial modulation of intensity with reference to an entire or parts of the detected ray cross-section; and

said device being structured and arranged for handling multiple rays.

37. The device in accordance with claim 36, additionally comprising parts of said device being provided in multiple for handling the multiple rays.

38. A device for detecting optical signals, comprising means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

- (i) frequency shift and modulation;
- (ii) phase shift and modulation; and
- (iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical signal to be detected and reference light ray(s) such that they can be brought into interference; and

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation;

wherein at least one wavelength-dependent element (11, 12, 14) is structured and arranged to change angle(s) of the rays brought into interference depending upon wavelength;

at least one of the detectors (40) is structured and arranged, alone or in combination with at least one of a demodulator (50) and optical elements, to measure at least one of time and spatial modulation of intensity with reference to an entire or part of the detector ray cross-section; and

additionally comprising means structured and arranged for changing the ray cross-section of at least one of the rays involved.

39. A device in accordance with claim 21, additionally comprising means structured and arranged for providing at least one of spectral filtration, and spatial modulation of at least one of phase and amplitude of at least one of said rays involved.

40. A device for detecting optical signals, comprising means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

- (i) frequency shift and modulation;
- (ii) phase shift and modulation; and
- (iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical signal to be detected and reference light ray(s) such that they can be brought into interference; and

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation;

wherein at least one wavelength-dependent element (11, 12, 14) is structured and arranged to change angle(s) of the rays brought into interference depending upon wavelength;

at least one of the detectors (40) is structured and arranged, alone or in combination with at least one of the demodulator (50) and optical elements, to measure at least one of time and spatial modulation of intensity with reference to an entire or part of the detector ray cross-section; and

additionally comprising at least one of (a) and (b):

- (a) wave guides structured and arranged such that all or part of the rays involved are guided wholly or partially therethrough; and
- (b) all or part of the optical elements being formed by integrated optics.

41. A device in accordance with claim 21, which is an optical receiver, or optical modulator, or spectrometer.

42. A device in accordance with claim 21, omitting a local oscillator.

43. A device in accordance with claim 22, omitting a local oscillator.

44. The device in accordance with claim 21, structured and arranged for using a ray path of a Michelson interferometer, and comprising

a beam splitter (10),

a prism (12) structured and arranged as the wavelength dependent element,

a mirror (20) and means for shifting the same to constitute a phase modulator,

another mirror (30) pivotally provided to adjust the wavelength to be detected,

a detector (40) structured and arranged to have an areal design and integrate intensity over the entire cross-section of the ray to be detected,

a lock-in amplifier as the demodulator (50), and

a modulator control (60) structured and arranged for controlling the first mirror (20) as the phase modulator.

45. The device in accordance with claim 22, structured and arranged for using a ray path of a Michelson interferometer, and comprising

a beam splitter (10),

a prism (12) structured and arranged as the wavelength dependent element,

a mirror (20) and means for shifting the same to constitute a phase modulator,

another mirror (30) pivotally provided to adjust the wavelength to be detected,

a detector (40) structured and arranged to have an areal design and integrate intensity over the entire cross-section of the ray to be detected,

a lock-in amplifier as the demodulator (50), and

a modulator control (60) structured and arranged for controlling the first mirror (20) as the phase modulator.

46. The device in accordance with claim 21, structured and arranged for using the ray path of a Mach-Zehnder interferometer, and comprising

- a first beam splitter (11) structured and arranged as a diffracting optical element and forming the wavelength-dependent element,
- a first mirror (20) and means for shifting the same to form a phase modulator,
- a second mirror (30) being pivotally mounted for adjusting the wavelength to be detected,
- a second beam splitter (13) being structured and arranged as a combiner for bringing partial rays into interference,
- two detectors (40, 40') structured and arranged for detecting the interference rays, to have an areal design and integrate the intensity over the whole cross-section of the detectors in each case,
- a lock-in amplifier with differential input constituting the demodulator (50) and
- a modular control (60) structured and arranged as said shifting means to control the first mirror (20) as the phase modulator.

47. The device in accordance with claim 22, structured and arranged for using the ray path of a Mach-Zehnder interferometer, and comprising

- a first beam splitter (11) structured and arranged as a diffracting optical element and forming the wavelength-dependent element,
- a first mirror (20) and means for shifting the same to form a phase modulator,

a second mirror (30) being pivotally mounted for adjusting the wavelength to be detected,

a second beam splitter (13) being structured and arranged as a combiner for bringing partial rays into interference,

two detectors (40, 40') structured and arranged for detecting the interference rays, to have an areal design and integrate the intensity over the whole cross-section of the detectors in each case,

a lock-in amplifier with differential input constituting the demodulator (50) and

a modular control (60) structured and arranged as said shifting means to control the first mirror (20) as the phase modulator.

48. A device in accordance with claim 21, structured and arranged for detecting one of partial rays delayed in time, such that there is a time shift between the reference and signal rays, comprising

means for providing the change in relative position between partial rays by providing time displacement of one of the partial rays,

a glass fiber (70) structured and arranged for guiding of an incident signal therethrough,

a first beam splitter (80) structured and arranged with glass fiber technology and through which the incident signal is guided subsequent to said glass fiber (70),

means for expanding one part of said signal,

a second beam splitter (13) through which said expanded signal is guided after a short period,

a mirror (30) pivotally mounted for adjusting wavelength to be detected and guiding said expanded signal to said second beam splitter (13),

a travel distance (90) arranged for delaying the other part of the signal having passed through said first beam splitter (80),

means for expanding said other delayed ray and guiding the same to said second beam splitter (13),

a wavelength-dependent element (14) structured and arranged as a diffracting optical element for guiding said delayed and expanded ray to said second beam splitter (13) along said travel distance (90),

said second beam splitter (13), structured and arranged as a combiner for bringing said partial rays into interference with one another,

detectors (40, 40') structured and arranged for detecting said combined rays, to have an areal design and integrate the intensity over the entire cross-section of the ray to be detected in each case, and

said demodulator (50) being electronic and having a varying design depending upon modulation type of the signal.

49. A device in accordance with claim 22, structured and arranged for detecting one of partial rays delayed in time, such that there is a time shift between the reference and signal rays, comprising

means for providing the change in relative position between partial rays by providing time displacement of one of the partial rays,

a glass fiber (70) structured and arranged for guiding of an incident signal therethrough,

a first beam splitter (80) structured and arranged with glass fiber technology and through which the incident signal is guided subsequent to said glass fiber (70),

means for expanding one part of said signal,

a second beam splitter (13) through which said expanded signal is guided after a short period,

a mirror (30) pivotally mounted for adjusting wavelength to be detected and guiding said expanded signal to said second beam splitter (13),

a travel distance (90) arranged for delaying the other part of the signal having passed through said first beam splitter (80),

means for expanding said other delayed ray and guiding the same to said second beam splitter (13),

a wavelength-dependent element (14) structured and arranged as a diffracting optical element for guiding said delayed and expanded ray to second beam splitter (13) along said travel distance (90),

said second beam splitter (13), structured and arranged as a combiner for bringing said partial rays into interference with one another,

detectors (40, 40') structured and arranged for detecting said combined rays, to have an areal design and integrate the intensity over the entire cross-section of the ray to be detected in each case, and